PRCI Project Ref: ENV-1

QUARTERLY REPORT

Pipeline Integrity Management for Ground Movement Hazards

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Prepared For: United States Department of Transportation
Pipeline and Hazardous Materials Safety Administration
Office of Pipeline Safety

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Technical Status

Activities undertaken through the tenth quarter focused on Task 6: Assembly of Overall Guidelines Document. A summary of the technical status and results and conclusions to date are presented below for this task.

Task 6: Prepare Overall Guidance Document

Technical Status

Work this quarter focused on Tasks 6.7 and 6.8.

Results and Conclusions

- Task 6.7: Distribute 3rd draft guideline and obtain review comments
- Task 6.8: Prepare final guideline

The 3rd draft of the guideline was distributed at the end of September for review by PRCI and DOT. A project team meeting was held on October 14, 2008 in San Diego, California. Initial comments and questions were addressed with PRCI, DOT, and other team members at the meeting.

Presentations were given and the following comments were noted as areas where modifications to the guidelines were needed.

1. Summary flow charts in Section 2:
    a. In the notes for the flow charts, add references to sections in guidelines where additional information is provided relative to steps in the process
    b. Modify charts to eliminate "endless" loop in mitigation options

2. Make sure actions related to relieving stress in pipelines are included as a mitigation measure in Section 8 (operational measures).
3. Clarify that while slow slip rates do not preclude potential for large displacements, pipe or geotechnical mitigation of large displacements is not required. It is acceptable, and expected, that operational measures, perhaps in combination with other design measures, will generally be used to address risks from slowly moving slides.

4. Frost heave should be removed as a hazard in the notes for the subsidence flow chart in Section 2. The guidelines only address subsidence from thaw settlement.

5. Landslide activity characterization descriptions should be reviewed to determine if it is appropriate to characterize a slope with a vaguely discernable scarp as inactive.

In addition to specific comments on the guidelines, several topics were identified for future study and incorporation into updates to the guidelines.

1. Additional testing should be considered to provide an understanding of the substantial differences between the axial-lateral interaction behavior observed during the ENV-1 work and previous work by Hsu.

2. The revised relationships developed in the ENV-1 project for defining soil springs for pipeline-soil interaction analysis should be incorporated into the existing PRCI seismic guidelines (published in 2004).

3. There is a substantial set of proprietary pipe-soil interaction test data from prior work at C-CORE for GERG (Groupe Europeen de Recherches Gazieres) that could be used to improve soil spring models if permission can be obtained for release of the data.

4. Earthquake-triggered slope movement was specifically not included in the scope of the ENV-1 project. A future task to incorporate earthquake triggered slope movement should be considered.

5. A key step in the management of landslide and subsidence hazards is to define the level of acceptable pipeline performance. The guidelines developed in the ENV-1 project assume that each utility or pipeline operator defines this performance on a case-by-case basis. For some users, particularly those that may not routinely deal with geohazards, more explicit guidance on defining acceptable performance would be beneficial. Two possible approaches were discussed although other approaches likely exist.
    a. Provide examples of what performance has been accepted in the past
    b. Develop a weighted parameter process to relate the level of performance to a numerical "score" based upon the impact of pipeline damage on safety, economic loss, and public perception

All other efforts on the project this quarter were directed at incorporating changes to address review comments. The cut-off date for receiving final comments was November 30, 2008.

Plans for Future Activity

The project is essentially complete as work is underway to issue the modified version of the final guidance document to PRCI by year end. Once PRCI has reviewed this final submittal, PRCI will upload the final version to the DOT website.

Meeting and Presentations

A public presentation of the findings from the ENV-1 project is planned for the PRCI Research Exchange Meeting on February 3-5, 2009 at the Georgia Tech University Conference Center in Atlanta, Georgia.

A presentation of some of the key results from ENV-1 will be made at the 17th Biennial EPRG-PRCI-APLA Joint Technical Meeting on Pipeline Research to be held in Milan, Italy in May 2009.